

DETAILED ACTION

Response to Amendment

1. The remarks and amendment filed 7/26/2011 has been entered and fully considered.
2. Claims 1, 7-14 and 18-24 are presented.
3. Claims 1 and 14 are amended.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1, 7-12, 14 and 18-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miyazawa et al., JP2003-040840 A (English Translation attached) in view of Hatakeyama et al., U.S. Patent No. 7,001,707 B2.

Miyazawa teaches a positive resist composition comprising a resin increasing alkali-solubility by action of an acid and an acid generator.

With regards to claim 1, Miyazawa teaches the resin (A) comprises recurring units of formula (7) [reference paragraph 0053], which are representative of constitutional unit (a1) in present claim 1, when X is a divalent aliphatic cyclic group (cyclohexyl), Y is a divalent methylene group, m=1, R²= a hydrogen atom and n=1.

With regards to constitutional unit (a2) in present claim 1, Miyazawa teaches other methacrylic acid ester monomer units other than formulas (1)-(7), including adamantyl methacrylate or cyclohexyl methacrylate [paragraph 0026].

With regards to constitutional unit (a3) in present claim 1, Miyazawa teaches formula (1), paragraph [0010-0012], wherein R1 is a hydrocarbon, R2 is a cyclohexane group (paragraph 0012), R3= hydrogen or cyclic alkyl (paragraph 0011) and n=2 as previously taught in reference claim 1. Miyazawa does not specifically teach the monomer units in amounts of 20-80mol%. However, it would have been obvious to one of ordinary skill in the art that constitutional units that are representative of (a1) and (a2) in present claim 1 would be present in amounts of 20 to 80mol% because Miyazawa teaches that each monomer unit is present in a composition ratio of 30-100% (page 8, [0031]).

With regards to claim 7, the cyclohexyl group is an aliphatic cyclic group.

With regards to claims 8 and 9, the monomer unit that is representative of constitutional unit (a1) may comprise formula (1), wherein the R2 group is substituted as a norbornene group, which is the polycyclic group as claimed (paragraph 0012).

With regards to claims 10 and 11, formula (1) may be substituted with an adamantyl group as R2 and is representative of (a2) in claims 10 and 11 paragraph [0012].

With regards to claim 12, applicant does not claim a liquid immersion lithography process. Therefore, the limitation in claim 12, "wherein a medium for liquid immersion lithography is water" is intended use and does not add patentable weight to the claim. Applicant is reminded of MPEP 2106.

The combination of recurring units (a1), (a2) and (a3) is not exemplified in the reference. However, it would have been obvious to one of ordinary skill in the art to combine the recurring units because Miyazawa teaches any combination of the formulas (1)-(7) and additional monomer units are suitable to form the acid dissociable, dissolution inhibiting resin for the resist composition. Miyazawa does not teach the nitrogen-based compound as presently claimed.

Additionally, Hatakeyama teaches a resist composition comprising an acid-labile resin, a photoacid generator and a base compound. The acid-labile resin comprises methacrylic acid esters substituted with cyclic hydrocarbons with fluorinated alcohol substituents (examples in columns 26, 27 and 28). The based compound preferably comprises tris-methoxymethoxyethylamine (example in col. 35, line 49 and example in col. 36, lines 15-20). Miyazawa and Hatakeyama teach similar resist compositions. Further, Miyazawa teaches the resist may also comprise an additional compound, such as a quencher (page 10, [0046]). The base compound in Hatakeyama controls the diffusion of acid in the resist, which is a quencher. Therefore, it would have been obvious to one of ordinary skill in the art to add tris-methoxymethoxyethylamine to the composition of Miyazawa to suppress the rate of acid diffusion within the resist film, resulting in better resolution, suppresses changes in sensitivity following exposure and improves exposure latitude and pattern profile (col. 18, lines 50-57).

6. Claims 1, 13, 14, 23 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miyazawa et al., JP2003-040840 A in view of Hatakeyama et al., U.S. Patent No. 7,001,707 B2 and further in view of Endo et al., U.S. Patent Publication No. 2004/0259040 A1.

Miyazawa teaches a positive resist composition comprising a resin increasing alkali-solubility by action of an acid and an acid generator as relied upon above.

Miyazawa teaches a method of forming a resist pattern. However, Miyazawa in view of Hatakeyama does not teach a method of forming the resist pattern by immersion lithography.

Additionally, Endo teaches an immersion exposure method comprising supplying water as the immersion liquid onto a resist film, exposing through the immersion liquid, baking and developing the resist film (page 58, [0058-0059]). It would have been obvious to one of ordinary skill in the art to use immersion exposure in the composition of Miyazawa because immersion exposure is well known to improve resolution and refine patterns at conventional exposure wavelengths (page 1, [0003-0004]).

Response to Arguments

7. Applicant's arguments filed 7/26/2011, with respect to the rejection(s) of claim(s) 1, 7-12, 14 and 18-22 under 103(a) and claims 13, 14, 23 and 24 under 103(a) have been fully considered and are persuasive. Therefore, the rejections have been withdrawn. However, upon further consideration, new ground(s) of rejection are made herein.

8. Applicant argues that *Miyazawa nowhere teaches or suggests a nitrogen-containing organic compound, as claimed.*

Miyazawa teaches the resist composition may comprise a quencher, which is a nitrogen-based compound. In the new 103(a) rejection, Hatakeyama is relied upon for the teaching of specific quenchers, such as tris-methoxymethoxyethylamine to suppress the rate of acid diffusion in the resist film, improve resolution, suppress changes in sensitivity and improve exposure latitude and pattern profile.

9. Applicant argues that *it is alleged in the office action that the motivation for modifying the composition of Miyazawa based on the alleged teachings of Endo would have been because "immersion exposure is well known to improve resolution and refine patterns at conventional exposure wavelengths." (office action, p. 5). However, this alleged motivation does not identify any benefit to making such a modification that can be found in the references or otherwise, i.e. why would the skilled artisan would have wanted to be able to improve resolution and refine patterns at conventional exposure wavelengths in Miyazawa based on the state of the art.*

Miyazawa teaches forming a resist pattern by a conventional lithographic method. Endo teaches that conventional lithographic methods of exposure in short wavelengths form versus forming a resist with immersion exposure (page 1, [0004-0021]). The immersion exposure method clearly improves pattern defects and resolution. Miyazawa and Endo are in the same field of endeavor. Therefore, Miyazawa would benefit from the immersion exposure taught by Endo.

Conclusion

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the

shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to CONNIE P. JOHNSON whose telephone number is (571)272-7758. The examiner can normally be reached on 7:30am-4:00pm Monday thru Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cynthia Kelly can be reached on 571-272-1526. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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